lopment and distribution of organic life as on the other hand the often considerable aid meteorological researches may obtain from purely biological facts, render it desirable that these two sciences, which may appear very different, do not become strangers to each other but mutually come into closer alliance with the object in view, to contribute to the scientific solution of the many yet unsolved physical and biological problems.

(*To be continued.*)

## OUR ASTRONOMICAL COLUMN

THE BINARY STAR ξ BOOTIS.—Dr. Doberck, of the Markree Observatory, has published elements of this revolving double-star, which appear to represent very satisfactorily the measures up to the present time, allowance being made for some obvious errors of observation. The orbit, which differs materially from those calculated upon shorter series of measures by Mädler, Herschel, and Hind, is as follows :—

Peri-astron passage, 1770·44. Period, 127·97 years.
Node ... 12° 1′ Inclination ... 37° 53′
Node to peri-astron, on orbit ... 130° 54′
Eccentricity ... ... 0·6781
Semi-axis major ... 4″·813

At the epoch 1782·28 these elements give the position 24°·1, distance 3″·64 ; and for 1804·25, position 352°·5, distance 6″·53 ; for Dembowski's epoch 1870·87 the errors are + 0°·3 and – 0″·11. The following figures are deduced from Dr. Doberck's elements :—

| | | ° | | ″ | | | ° | | ″ |
|---|---|---|---|---|---|---|---|---|---|
| 1876·0, | Pos. | 283·7 | Dist. | 4·29 | 1892·0, | Pos. | 224·7 | Dist. | 2·35 |
| 1880·0, | ,, | 274·5 | ,, | 3·84 | 1896·0, | ,, | 188·2 | ,, | 1·82 |
| 1884·0, | ,, | 262·8 | ,, | 3·36 | 1900·0, | ,, | 111·9 | ,, | 1·31 |
| 1888·0, | ,, | 247·1 | ,, | 2·86 | | | | | |

Dr. Doberck has now investigated elements of σ Coronæ Borealis, τ and λ Ophiuchi, $\mu^2$, 44 and ξ Bootis, γ and ω Leonis, η Cassiopeæ, and several other stars, thus greatly adding to our knowledge of the orbits of the binaries, his discussions being at the same time conducted in a very exhaustive manner, to date.

VARIABLE STARS.—In No. 2,119 of the *Astronomische Nachrichten* are observations of a number of variable stars, made in 1875 by Mr. Chandler of New York. There was a well-marked minimum of that irregular variable α Herculis on August 21 ; the observations of W and X Sagittarii are worthy of note, as they support the results previously given by Prof. Schmidt, of Athens, and are stated to have been made without any "pre-occupation of mind in the observer," who had no previous knowledge of the character of the light variations. Schmidt's period for W, is 7·5933 days, and for X, 7·0119 days ; another star in the same constellation, U Sagittarii of the last catalogue by Prof. Schönfeld, is assigned a period of 6·7452 days. The three stars were added to the variable star list by the indefatigable director of the Observatory at Athens, in the summer of 1866.

Mr. J. E. Gore (Umballa, Punjab) writes, suggesting the variability of Lalande 42360. The place in the catalogue depends upon an observation made August 7, 1793, when the star was rated 7m. Argelander ("Bonn Observations," vol. vii. p. 181) identifies this star with No. 42383 of the catalogue, observed as an 8m., September 29, 1791. Considering that there is an error in the record of the time of transit ; the declinations closely agree.

DAMOISEAU'S TABLES OF JUPITER'S SATELLITES.—Independent extensions of these Tables, which run out in 1880, have been made in Europe and America. Prof. Coffin, superintendent of the American Ephemeris, notifies an extension to 1900, which has been carried into effect by Mr. D. P. Todd, we believe under the superintendence of Prof. Newcomb. The work will be sent to any library or astronomer possessing a copy of the Tables, on application to the office at Washington. Before the time named it may be hoped that both as regards theory and observation, the laborious operation of forming new Tables may be justified by the certainty of obtaining results which will enable us to predict the phenomena of the satellites, with considerably greater accuracy than can be effected by the use of Damoiseau's Tables. And we may also express the hope that as regards systematic observations, the Astronomer-Royal's urgent recommendation will not be lost sight of.

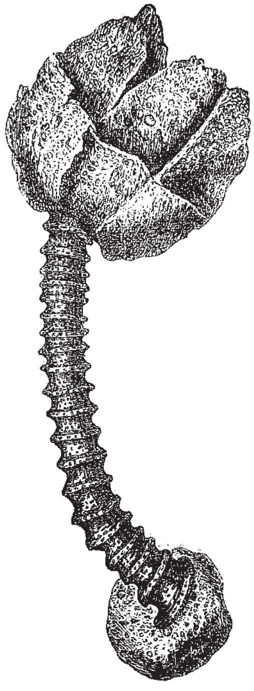
BESSEL'S TREATISES.—Volume iii. of the reprint of the more important of the many papers by Bessel on astronomical and other subjects, which completes the work, was issued a short time since by Dr. Engelmann, and comprises geodesy, physics, and general astronomical subjects, as the libration of the moon, shooting-stars, the mass of Jupiter, and the theory of eclipses. Speaking of the work as a whole, it will prove a very valuable aid to the student of Astronomy, affording him without the labour and difficulty of consulting a number of publications, the means of acquainting himself with the principal memoirs of the illustrious Professor of Königsberg, who may be said to have revolutionised the practice of astronomy. Dr. Busch's "Verzeichniss sämmtlicher Werke, Abhandlungen, Aufsätze, und Bemerkungen, von F. W. Bessel," printed in vol. xxiv. of the Königsberg observations, and subsequently in a separate form, contains 385 articles, and we believe, with only one or two exceptions, Dr. Engelmann's three volumes will be found to contain all that are of more permanent interest and value.

## BIOLOGICAL NOTES

THE ELECTRIC EEL.—Since Humboldt's discovery of the electric eel and his observations of its peculiar properties, carried out unfortunately before the discovery of the voltaic pile, strange to say, no attempt has been made to study this remarkable reptile in its natural surroundings. In view of this fact, the Berlin Academy of Sciences sent the well-known histologist and physiologist Dr. Carl Sachs, last September, to the scene of Humboldt's former activities, well equipped with an ample supply of electro-physiological apparatus, and means for carrying out an extensive series of observations. In the last session of the Academy a letter dated December 7 was read from Dr. Sachs, in which he stated that he had safely performed the journey from Caraccas, over the Cordilleras, to the *Llanos*. The gymnotus had disappeared from the neighbourhood of Rastro, where Humboldt's investigations took place, but at a distance of a few miles from the city of Calabozo, a river was found fairly alive with the dreaded *temblador*. In the five days which had elapsed since the discovery of the locality, many valuable results had been afforded by the observations, and there was every prospect that the expedition would yield a large number of new and important additions to our knowledge of the electro-motive organs.

EARLY DEVELOPMENT OF SPONGES.—At a meeting, on February 8, of the Société Vaudoise des Sciences Naturelles, Prof. Forel spoke on an interesting occurrence of an early development of sponges in the Lake of Geneva, due to the unusually mild winter of this year. The fluviatile sponge of the lake consists of a horny skeleton with very fine siliceous spiculæ, covered with a sheet of soft, perforated animal matter. Usually, in autumn, this soft matter leaves the exterior ramifications and condenses under the form of small gemmulæ, half a millimetre in diameter, in the deepest interior parts of the horny skeleton. There it remains until the spring, when it expands anew upon the ramifications, and covers them with a sheet of living animal matter. But this year M. Forel observed on February 2, besides many sponges in their hibernal state, a colony of other sponges which had already reached their full summer development, differing only by a somewhat paler colour from the usual summer appearance. The occurrence is perfectly explained by the circumstance that the temperature of water in the Lake of Geneva was this year higher by two degrees than the average temperature for many years, which is 6°·3 Cels. for December and 4°·9 for January.

A NEW SPONGE.—Prof. E. Perceval Wright describes (*Proc. R. Irish Acad.*, vol. ii., ser. 2, part 7) a beautiful little sponge found growing on the fronds of some species of Red Seaweeds from the coasts of Australia, of which we give the accompanying illustration. The largest specimens measure not three millimetres in height. The sponge consists of three distinct and well-marked portions: firstly, a small basal disk; secondly, an elongated stem, on the summit of which expands the third portion, or capitulum. The disk is button-shaped, flat, and is formed of an irregular horny framework, twice to three times as broad as the stem. The stem varies in height, and presents the appearance, in some cases, of a series of margined rings, some twenty in number, fastened together one on the top of the other; in others the margins of the rings will be more prominent, and the bodies of the rings will be, as it were, more deeply sunk. In both these cases the horny framework is of a more or less evenly latticed character, the longitudinal lines of the lattice being very prominent. The head portion, in its natural state, probably presents a more or less spherical form, perhaps slightly flattened on the summit, with an indication of being divided into four nearly equal parts, the open space between these leading into the body-cavity of the sponge. In some of the specimens the head portion nearest to the stem seems to have been formed of a somewhat denser framework than the upper portion, so that while being pressed this upper portion has been fractured across. The framework here is of a densely-reticulated kind, in appearance reminding one of the reticulated network of the intracapsular sarcode in Thalassolampe, or of the tissues met with in some Echinoderms. This sponge has been called *Kallispongia archeri*. The wonderful mimetic resemblance which it bears to some Crinoid-forms can scarcely be overlooked. Leaving the texture and composition of the skeleton mass for the moment out of view, and simply looking at its outline—the circular disc-like base, the stem—the profile of which is absolutely the same, except as to size, as that of the pentacrinoid stage of *Antedon rosaceus*, and the slightly cleft head, the resemblance is very great. So far as is known, this is a unique case among the sponges, and one is left to wonder what may be the tiny enemies from which *Kallispongia archeri*, by this complete disguise, conceals itself.



*Kallispongia.*

WILD DOGS ON THE OBI.—An interesting occurrence of dogs which have reverted to the wild state is reported by M. Poliakoff from the neighbourhoods of Soorgoot on the Obi, and Tobolsk. The size of these animals is somewhat larger than that of the dogs of the locality, but less than that of wolves; their habits being rather remarkable the inhabitants would not acknowledge them to be common dogs, and the hunters preserved the skins of the individuals they happened to kill, as rare samples of unknown animals. M. Poliakoff could not, however, detect in the skins he describes any deviations from the common dog type, except the larger size, and perhaps a somewhat greater length of body, with comparatively shorter legs (at Tobolsk). But the habits of these animals are certainly wolf-like; they inhabit woods and live by hunting, which they carry on in companies. Ten individuals were thus well-known at Soorgoot as hunting in company the wild reindeer, and latterly they approached the settlements, causing a panic among the inhabitants by the ravages they made among cattle. They hunted always together, assailing their prey simultaneously. They are reported also to be far more voracious than wolves, and their habits, M. Poliakoff observes, resemble much those of the red highland wolf (*Canis alpinus*) of Eastern Siberia.

THE WOODPECKER.—At the session of the German Ornithological Society, on February 8, Prof. Altum gave an interesting address on the ordinary woodpecker, embodying a portion of the results of over seven years' observation. With regard to the question of how the woodpecker finds the trees inhabited by insects, he had noticed that it almost invariably resorted to such trees as bore the diseased look consequent upon the presence of insects, manifested by the smallness and fewness of the leaves, the absence of the usual fresh colour of the bark, &c. In some cases it is deceived, especially where new varieties of trees have been set out. When it has detected a hole bored in the bark by insects, it follows the course of the passage under the bark by a gentle tapping with its bill, until it reaches the place where the larvæ are situated, when, by tearing off large portions of bark, its food is laid bare. Among the insects not eaten by the woodpecker are such as the *Cerombyx heros*, which bores too deep into the wood, or small insects such as the *Bostichidæ*, living in the bark of the pine tree, which is difficult to penetrate. The presence of the woodpecker is good for a forest, in so far as it destroys the insects upon the trees. It however injures the latter frequently by tearing off large pieces of bark, and indirectly by eating the useful wood-ants. The statement that woodpeckers made incisions in trees free from insects, for the purpose of sucking the sap, was disproved by Prof. Altum, on ground of repeated observations.

SAGACITY OF A LOBSTER.—A few days ago, at the Rothesay Aquarium, a tank containing flat fishes was emptied, and a flounder of eight inches in length was inadvertently left buried in the shingle, where it died. On refilling the tank it was tenanted by three lobsters (*Homarus marinus*), one of which is an aged veteran of unusual size, bearing an honourable array of barnacles; and he soon brought to light the hidden flounder, with which he retired to a corner. In a short time it was noticed that the flounder was *non est.* It was impossible the lobster could have eaten it all in the interim, and the handle of a net revealed the fact that, upon the approach of the two smaller lobsters the larger one had buried the flounder beneath a heap of shingle, on which he now mounted guard. Five times within two hours was the fish unearthed, and as often did the lobster shovel the gravel over it with his huge claws, each time ascending the pile and turning his bold defensive front to his companions.

THE INFLUENCE OF TEMPERATURE ON THE NERVE- AND MUSCLE-CURRENT.—M. Steiner has proved (*Reichert's Archiv*) that the electromotive force of the nerve-current from 2° upwards, is greater the higher the temperature, that it reaches a maximum between 14° and 25°, and at higher temperatures decreases again. The force of the muscle-current is likewise, from 5° upwards, greater the higher the temperature; it has its maximum between 35° and 40°, and at higher temperatures becomes less again, till, when rigidity sets in, it is almost *nil*. Thus, for the nerve and muscle-current, as well as for other functions of living organic forms, there is a *temperature optimum* ; which is as distinctly marked when, by heating, we rise to it from lower temperatures, as when we descend to it by cooling from higher temperatures.

FERTILISATION OF FLOWERS BY BIRDS.—In an interesting article by Prof. Asa Gray, in the *American Journal of Science and Arts*, on Darwin's recent work the writer notices what Darwin says about the fertilising of flowers by birds, chiefly humming-birds. The frequenting of the flowers of *Impatiens* is the only case cited from the United States ; and Dr. Gray asks : "Can it be that there are no references in print to the most familiar fact that our humming-bird is very fond of sucking the blossoms of trumpet creeper (*Tecoma radicans*) and of honeysuckles? Both these are, in size and arrangement of parts, well adapted to be thus cross-fertilised."

A NEW PARASITIC GREEN ALGA.—Not very long since it was thought that the want of chlorophyll determined the parasitism of plants, and it is still true that the want of this green colouring substance serves to distinguish between fungi and algæ. It is also true that the former need already-formed carbon compounds, but it is still thought that chlorophyll-bearing plants not only do not require to find these compounds ready formed, but that they are absolutely unable to assimilate them. It was therefore a fact of great interest when Prof. Cohn described some years since (1872) a perfectly new chlorophyllaceous alga ("Ueber parasitische Algen" in *Beit. zur Biol. der Pflanzen*, Bd. i. Heft 2 ; see also W. Archer, *Quart. Journ. Mic. Science*, N.S., vol. xiii.), which he found living as a bright emerald green parasite in the thallus of duck-weed gathered at Breslau. For this the genus Chlorochytrium was established, and *C. lemnæ* was the only species until at a late meeting of the Dublin Microscopical Club, Prof. E. Perceval Wright exhibited and described a second species found growing and developing itself in the mucilaginous tubes of a species of Schizonema, collected on rocks at Howth, near Dublin, between high and low watermarks. There can be no question as to the parasite on the diatom being different from that on the duck-weed, while there is but little difficulty in placing it in Cohn's genus. Smaller in size its emerald lustre is scarcely if at all less than the fresh-water species, and like it its development has not been traced farther than the production of zoospores.

FLORA OF TURKESTAN.—We notice a very interesting communication on the Flora of Turkestan, made by Prof. Regel, the director of the St. Petersburg Botanical Garden, at the last meeting held on January 20, by the Russian Society of Gardening. The special aim of the communication being to advocate the introduction into European gardens of representatives of the flora of Turkestan, Prof. Regel described the numerous, original, and most beautiful species belonging to the *Compositæ*, *Caryophyllæ*, *Umbelliferæ*, *Papilionaceæ*, *Malvaceæ*, and *Campanulaceæ*, which grow in Turkestan, and which could rank among the best ornaments of our gardens by their variety and beautiful forms and colours. Most of these species are already cultivated with complete success in the St. Petersburg Botanical Garden, and they might be thus introduced in the gardens of Russia and Western Europe. Concluding his communication, Prof. Regel pointed out the remarkable circumstance that in Turkestan, even in hilly tracts, the *Ericaceæ* are totally wanting, whilst they are so common in the highlands of the Alps, of the Caucasus, and even of the Altai.

## *NOTES*

METEOROLOGISTS everywhere will learn with much satisfaction that Dr. Julius Hann, the eminent meteorologist, was appointed, February 10, successor to the late Dr. Jelinek, as Director of the Central-Anstalt für Meteorologie und Erdmagnetismus, Vienna.

FIFTY-SEVEN candidates for election into the Royal Society have offered themselves during the present session.

PROF. A. OPPENHEIM, of Berlin, has accepted the chair of chemistry in the newly-organised Philosophical Faculty at Münster.

PROF. PFEFFER, of Bonn, has accepted the ordinary professorship of Botany in the University of Basel.

THE Treasury have agreed to recommend votes from the Consolidated Fund for 80,000*l.* towards the new buildings devoted to the Science Schools of the University of Edinburgh, in four yearly instalments of 20,000*l.* each. This vote is to supplement a like amount subscribed by the public.

THE marble statue of Sir W. Fairbairn is in the hands of Mr. Geflowski, who obtained the Commission in competition with other eminent sculptors. Besides the statue, which is to stand in the New Town Hall, Manchester, facing the entrance, a Fairbairn scholarship is founded in Owens College, Manchester, out of the funds subscribed. The statue is eight feet high, representing Sir W. Fairbairn standing with papers in his hand as if delivering an address to a scientific audience, the head bare and inclined slightly, and an admirable likeness in the features as well as in the thoughtful expression and quiet energy characteristic of the man.

THE University of Tübingen is making preparations to celebrate its 400th anniversary during the coming month of August. Various historical addresses are in course of preparation, and a work will be issued commemorative of the occasion.

A PUBLIC meeting of the Sanitary Institute of Great Britain will be held at the rooms of the Society of Arts, John Street, Adelphi, on Wednesday, March 14, at 3 P.M., to consider the report recently issued by the Committee appointed by the President of the Local Government Board upon the disposal of town sewage.

HIS Majesty, the Emperor of Brazil, observed the eclipse of the moon on the evening of the 27th, at the Arcetri Observatory. The Emperor took a very lively interest in the phenomenon and discussed with acuteness the hypothesis with which Prof. Tempel, the astronomer, and Prof. Echert tried to explain the varying shades and colours in which the moon appeared during the different phases of obscuration. On Monday last his Majesty assisted at a meeting of the Anthropological Society, when Prof. Mantegazza made some interesting remarks on several Maori skulls, and Prof. Giglioli read an elaborate paper on the ethnology of Brazil.

THE general expenses of the seven Russian universities in 1876 were as follows :—The University of St. Petersburg, 43,500*l.* ; of Moscow, 52,850*l.* ; of Kieff, 38,375*l.* ; of Kazan, 39,500*l.* ; of Kharkof, 38,125*l.* ; of Odessa, 25,375*l.* ; and of Dorpat, 26,625*l.*

WE notice the following more important papers on natural science, among those published by professors of the Moscow University in 1876 :—"Observations de Jupiter en 1876," "Profil spectroscopique du Soleil en 1876," and "Sur la Queue de la Comète de 1874," by Prof. Bredikhin, in the *Annales* of the Moscow Observatory ; a paper, by Prof. Babukhin, "Ueber die Structur und Verhältnisse elektrischer und pseudo-elektrischer Organen," in the *Archiv für Anatomie und Physiologie*; "Théorie des Dérivées," and "On the Numerical Equations of the Second Degree," by Prof. Bugaïeff, in the Moscow *Mathematical Review* (Russian) ; the papers of Prof. Markovnikoff on Theine (NATURE, vol. xv. p. 167). An interesting popular lecture on Unicorns,